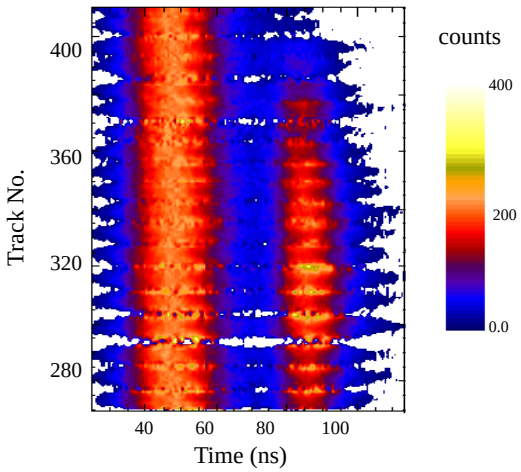
August 1994 Highlights of the Light Ion Inertial Confinement Fusion Program

The lithium target series continued until the third week of August, followed by start of a power coupling series. ICF managers participated in the August 2 - 4 ICFAC review at Los Alamos and in preparations for the Galvin Commission visit to Sandia. Jeff Quintenz and Dillon McDaniel traveled to Russia with LLNL, LANL, and DOE leaders to discuss future ICF collaborations.



Energy cut from one-dimensional slit-imaged soft x-ray camera on PBFA-II Shot 6517.

Seven cylindrical hohlraum target shots were completed in August on PBFA II, with the last five done in seven working days. For the March 1993 lithium target series we used an open-cone target. Goals of the present series were to optimize the temperature of a foam-filled cylindical hohlraum and to evaluate new diagnostics. The new diagnostics include a time-resolved diagnostic based on beam-induced x-ray emission, a titanium wire array diagnostic to measure the azimuthal beam symmetry and vertical focus, and a stepped witness plate to measure temperature from the difference in shock breakout time. Data of high quality were obtained (see figure), and analysis of the data is underway. Preliminary analysis verifies our prediction that the 1.5-mm- or 3-mm-diameter diagnostic hole in the 4-mm-diameter cylindrical endcap would remain open. This diagnostic hole is used to measure the temperature of the foam-filled hohlraum.

The number of contaminant ions is reduced and the high-energy lithium ions increased in cleaning and heating experiments with LiF anodes to reduce the parasitic load on SABRE. We are now preparing for a parasitic load series on PBFA II to test new hardware to heat the anode to 450°C, RF discharge clean the lithium emission surface, and provide local differential vacuum pumping. Toroid 4 is being reconfigured to include new systems to support and diagnose the new hardware. A consulting contract has been initiated with General Atomic, which has experience with impurity removal from tokamak walls. Hardware has been delivered for the RF glow source and for the chilled water system to cool the anode coils and the walls of the titanium getter pump. Delivery of all Phase-I hardware (without heaters) is expected by mid October; delivery of heated, Phase-II hardware is expected by the end of October. On the Integrated Test Facility, we are also testing, as a backup on PBFA II, the anode configuration used previously to heat two active sources, the Laser EVaporation Ion Source (LEVIS) and the electrohydrodynamics (EHD) source.

Preparations are being made for a September 20 - 21 workshop to address transport modes for a middle-weight-ion multigap accelerator. This concept is being examined jointly by the light and heavy ion communities as a possible single laboratory microfusion facility (LMF)/experimental test facility (ETF) to produce high yield and energy. Attendees at the workshop, hosted by SNL, will include LBL, LLNL, NRL, Cornell University, and the University of Wisconsin.

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